

5.5 Systems of Equations Word Problems

Date: _____

Warm up

1. Solve the given system by substitution:

$$\begin{array}{r} -3(2x - y = 7) \rightarrow -6x + 3y = -21 \\ 2(3x + 3y = -3) \rightarrow 6x + 6y = -6 \\ \hline 9y = -27 \\ \frac{9y}{9} = \frac{-27}{9} \end{array}$$

$$2x - (-3) = 7 \quad \leftarrow \boxed{y = -3}$$

$$\begin{array}{r} 2x + 3 = 7 \\ -3 \quad -3 \\ \hline 2x = 4 \\ \frac{2x}{2} = \frac{4}{2} \\ \boxed{x = 2} \end{array}$$

Solution:
(2, -3)

2. Solve the given system by elimination:

$$\begin{array}{r} -3x + 4y = -4 \\ + \quad 3x - 6y = 6 \\ \hline -2y = 2 \\ \frac{-2y}{-2} = \frac{2}{-2} \end{array}$$

$$\boxed{y = -1}$$

Solution:
(0, -1)

$$\begin{array}{r} 3x - 6(-1) = 6 \\ 3x + 6 = 6 \\ -6 \quad -6 \\ \hline 3x = 0 \\ \frac{3x}{3} = \frac{0}{3} \\ \boxed{x = 0} \end{array}$$

Steps for Writing & Solving a System of Equations:

1. Define all variables. (* what 2 "things" are discussed?)
2. Write the system of equations. (* Look for 2 "totals")
3. Solve: showing all steps.
4. State your solution in sentence form.

Problem 1: You are selling tickets for a high school basketball game. Student tickets cost \$3 and general admission tickets cost \$5. You sell 350 tickets and collect \$1450. How many of each type of ticket did you sell?

Let x = student tickets
 y = general tickets

$$\begin{array}{r} -3(x + y = 350) \rightarrow -3x - 3y = -1050 \\ 3x + 5y = 1450 \\ \hline 2y = 400 \\ \frac{2y}{2} = \frac{400}{2} \end{array}$$

$$\leftarrow \boxed{y = 200}$$

$$\begin{array}{r} 350 \\ -200 \\ \hline \boxed{150} \end{array}$$

200 general tickets and 150 student tickets sold!

Problem 2: At an Italian bistro, the costs of 2 plates of spaghetti and 1 salad is \$27.50. The cost for 4 plates of spaghetti and 3 salads is \$59.50. Find the cost of a plate of spaghetti and a salad.

Let $p = \$$ spaghetti
 $A = \$$ salad

$$\begin{array}{r} -3(2P + A = 27.50) \rightarrow -6P - 3A = -82.50 \\ 4P + 3A = 59.50 \end{array}$$

$$\begin{array}{r} -6P - 3A = -82.50 \\ 4P + 3A = 59.50 \\ \hline -2P = -23 \\ \hline -2P = -23 \\ -2 \quad \quad -2 \end{array}$$

$$2(11.50) + A = 27.50$$

$$\begin{array}{r} 23 + A = 27.50 \\ -23 \quad \quad -23 \end{array}$$

$$\boxed{P = 11.50}$$

$$\boxed{A = 4.50}$$

Spaghetti costs \$11.50
and salad costs \$4.50.

Problem 3: Peggy walks at a rate of 2 miles per hour and jogs at a rate of 4 miles per hour. She walked and jogged 3.4 miles in 1.2 hours. For how long did Peggy jog and for how long did she walk?